

Q17 Describe the anatomy of the sympathetic nervous system (Sept 2013)

The autonomic nervous system ANS consists of the sympathetic and parasympathetic divisions and is responsible for the maintenance of homeostasis.

PREGANGLIONIC DIVISION OF SNS

The sympathetic nerves originate from columns of preganglionic neurons in the grey matter of the lateral horn of the spinal cord from the first thoracic segment down to the second or third lumbar segment.

The preganglionic fibres leave the spinal cord through the ventral roots with the spinal nerves and then leave the spinal nerves as white rami communicantes (myelinated B fibres) to synapse with the postganglionic neurons in the ganglia of the sympathetic chain at the same level, at a higher or lower level, or alternatively they can pass straight through the chain to join a splanchnic nerve and synapse with a postganglionic neuron there.

POSTGANGLIONIC DIVISION OF SNS

The ganglia form the sympathetic chain. Postganglionic fibres leave the ganglia as grey rami communicantes (unmyelinated C fibres) and join the spinal nerves or visceral nerves to innervate the target organ.

The sympathetic chains extend down the length of the vertebra and are divided into four parts:

- CERVICAL PART → consists of three ganglia (superior, middle, inferior), which supply the head, neck and thorax. The inferior cervical ganglion or stellate ganglion is fused with the first thoracic ganglion.
- THORACIC PART → a series of ganglia from each thoracic segment. Branches from T1-5 supply the aortic, cardiac and pulmonary plexuses, the lower seven form the splanchnic nerves via the coeliac, inferior and superior mesenteric ganglia.
- LUMBAR SYMPATHETIC GANGLIA → situated in front of the vertebral column as the prevertebral ganglia.
- PELVIC PART → lies in front of the sacrum and contribute to the hypogastric and pelvic plexus.

The adrenal medullary tissues are considered to be modified sympathetic postganglionic neurons, with the nerves supplying this tissue equivalent to the sympathetic preganglionic fibres. They release noradrenaline directly to the circulation.

All preganglionic fibres are cholinergic. The majority of postganglionic fibres in the SNS release noradrenaline at target sites, which acts on adrenoreceptors. Acetylcholine is released at sweat glands.

The PARASYMPATHETIC division arises from nuclei at CN 3, 7, 9 and 10 (Edinger-Westphal, superior and inferior salivatory nuclei, DMX and NST) and S2-4.